Collaborative Testing Services, Inc.

Color & Appearance Testing Program

Summary Report #177 - 3rd Qtr 2016

About the Color Program, About CTS

Key to Tables and Graphs (Color Tests)

Key to Tables and Graphs (Spectro Test)

Key to Tables and Graphs (GlossTests)

Analysis	Analysis Name
408	Color & Color Difference (Paint Chips) - 45-0
409	Color & Color Difference (Paint Chips) Sphere
411	Spectrophotometric (Paint Chips) - Sphere
440	Gloss 60 Degree (Paint Chips)
442	Gloss 85 Degree (Paint Chips)

About The Color & Appearance Program

The Collaborative Reference Program for Color & Appearance is operated and maintained by Collaborative Testing Services, Inc. (CTS), with technical guidance and advice provided by representatives from various instrument manufacturers. The program allows laboratories to compare periodically the performance of their testing with that of other laboratories.

Paint chip samples, which have been custom-made specifically for Collaborative Testing Services by Munsell Color, X-Rite Inc., Grand Rapids, MI, are distributed four times per year to participating laboratories. Gloss participants test two pairs of paint chip samples at different gloss levels, approximately 5-10 units apart. Color & Color Difference participants measure a set of two opaque color paint chips, selected from throughout the full color spectrum, consisting of a nonmetameric match with small color differences. These data are analyzed in two separate tables based on the conditions of measurement used. Laboratories that also participate in the Spectrophotometric analyses measure one of the opaque color chips for % reflectance at 16 wavelengths.

Please refer to each test's 'Key' for definitions of terms used in the tables and graphs and guidelines to interpreting the results. Also shown are notes concerning specific laboratory results, as well as significant findings related to instrument types or other testing variations.

ABOUT CTS

Founded in 1971, CTS is a privately-owned company that specializes in interlaboratory tests for a wide variety of industries, including rubber, plastics, fasteners and metals, containerboard, paper, color, and wine as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality control objectives. Labs from the U.S., as well as more than 80 countries, currently participate in the CTS programs.

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Key for Color Program Web Summary Report

WebCode — Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Color Report published on the CTS web site. The Web Code for each analysis can be found in the Performance Analysis Report mailed to each participant.

Lab Mean — The average of the 2 test results obtained by the participant for CIE L*,a*,b* color space values.

Grand Mean — The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.

Between-Lab Standard Deviation — An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).

Comparative Performance Value — An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.

Graphs — For each laboratory, the LAB MEAN for the first sample is plotted against the LAB MEAN for the second sample with each point representing a laboratory. The horizontal and vertical axes are the GRAND MEANS for each sample. For each test there are three plots: L*2 vs L*1, a*2 vs a*1 and b*2 vs b*1. The a* and b* plots are created using absolute values.

Inst Code — A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).

Data Flag — DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	INCLUDED	**CAUTION** - review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.
X	EXCLUDED	**STOP** - immediate review of data and/or testing procedure is required. Results fall outside the 99% ellipse and one or more CPV are greater than critical value. See specific notes following each table for more information on why the data is excluded. It is also possible to have an "X" for individual color coordinate (L*, a* or b*) without overall "X" flag. It means that results fall outside the 99% ellipse for particular coordinate but have no CPV flags. Those results will not require any action.
M	EXCLUDED	**PROCEED** - lab was unable to report data for at least one sample. However, a lab receiving two of more M flags for a test may need to stop and review its testing procedures.

Key for Spectrophotometric Web Summary Report

WebCode — Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Color Report published on the CTS web site. The Web Code for each analysis can be found in the Performance Analysis Report mailed to each participant.

Grand Mean — The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.

Between-Lab Standard Deviation — An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).

Inst Code — A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).

Data Flag — DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	INCLUDED	**CAUTION** - review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.
X	EXCLUDED	**STOP** - immediate review of data and/or testing procedure is required. See specific notes following each table for more information on why the data is excluded.

In addition to the DATA FLAG column, it is also possible to have an X on individual wavelength values as follows:

X - The laboratory's mean for that wavelength is greater than a 95% deviation from the GRAND MEAN.

Key for Gloss Web Summary Report

WebCode Assigned laboratory identification number (temporary) used to ensure lab confidentiality while permitting a lab to locate its data in the Color Report published on the CTS web site. The Web Code for each analysis can be found in the Performance Analysis Report mailed to each participant.

Lab Mean The average of the test results obtained by the participant.

Grand Mean The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.

Difference from Grand Mean The difference of the LAB MEAN from the GRAND MEAN.

Between-Lab Standard Deviation An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).

Comparative Performance Value An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN. The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa). The critical value for each CPV will vary depending on the number of labs participating in a test.

Inst Code A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).

Graphs For each laboratory, the LAB MEAN for the first sample (x-axis) is plotted against the LAB MEAN for the second sample (y-axis) with each point representing a laboratory. The horizontal and vertical cross-hairs are the GRAND MEANS for each sample. When 20 or more laboratories are in the statistics, an ellipse is also drawn so that 95% of the time a randomly selected laboratory will be included inside the ellipse. Plotted data flags are explained above.

Data Flag DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

DATA FLAG	STATISTICALLY INCLUDED/EXCLUDED	ACTION REQUIRED
*	INCLUDED	**CAUTION** - review testing procedure and monitor future results. Results fall outside 95% ellipse but within a 99% ellipse that is calculated but not drawn.
X	EXCLUDED	**STOP** - immediate review of data and/or testing procedure is required. Results fall outside the 99% ellipse. See specific notes following each table for more information on why the data is excluded.
M	EXCLUDED	**PROCEED** - lab was unable to report data for at least one sample. However, a lab receiving two of more M flags for a test may need to stop and review its testing procedures.

			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
4KBY3J		C161 C162	55.30 56.45	-10.73 -10.70	-5.60 -5.77	1.15	0.03	-0.17	1.16	XZ
698CWQ		C161 C162	54.96 56.11	-10.70 -10.68	-5.56 -5.71	1.16	0.03	-0.16	1.17	XO
6MZRDT		C161 C162	54.93 56.04	-10.49 -10.46	-5.85 -6.02	1.11	0.03	-0.17	1.12	HW
6W8XFN		C161 C162	55.07 56.15	-10.82 -10.77	-5.51 -5.68	1.08	0.05	-0.17	1.09	XU
7CUUVN		C161 C162	55.09 56.21	-10.70 -10.68	-5.54 -5.70	1.12	0.03	-0.16	1.13	XN
8LFQJP		C161 C162	54.57 55.75	-10.82 -10.77	-5.54 -5.73	1.18	0.05	-0.19	1.20	HY
9UMRGV		C161 C162	54.86 55.97	-10.78 -10.77	-5.68 -5.82	1.11	0.01	-0.14	1.12	TO
AXRC4D		C161 C162	55.37 56.49	-10.81 -10.75	-5.74 -5.87	1.12	0.06	-0.14	1.13	AB
BV8HGQ		C161 C162	54.86 56.18	-10.89 -10.79	-5.41 -5.58	1.32	0.11	-0.17	1.34	GE
BXC48C		C161 C162	54.77 55.97	-10.54 -10.52	-5.91 -6.08	1.20	0.02	-0.18	1.21	HW
CFVUQN		C161 C162	54.67 55.79	-10.40 -10.35	-5.99 -6.16	1.12	0.04	-0.17	1.14	MG
CTG2UG		C161 C162	54.80 55.98	-10.46 -10.41	-5.82 -6.00	1.19	0.05	-0.18	1.20	HW
DBFJDK		C161 C162	54.95 56.06	-10.50 -10.49	-5.83 -5.98	1.10	0.00	-0.15	1.11	HW
EZPKZJ	X	C161 C162	54.97 55.91	-11.00 -11.09	-4.78 -5.03	0.95	-0.09	-0.25	0.98	HG
H3Z8NF		C161 C162	55.03 56.13	-10.59 -10.56	-5.77 -5.93	1.10	0.03	-0.16	1.11	HW
HHGNUH		C161 C162	55.44 56.45	-10.80 -10.82	-5.42 -5.57	1.01	-0.03	-0.15	1.02	GH

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			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
HYX8NH		C161	55.06	-10.52	-5.94	1.16	0.04	-0.16	1.17	HW
		C162	56.22	-10.48	-6.10					
JU8BQJ		C161	55.27	-10.70	-5.66	0.95	0.02	-0.16	0.96	XO
		C162	56.21	-10.68	-5.82					
KWJLRD		C161	55.39	-10.79	-5.76	1.16	0.07	-0.17	1.17	HY
		C162	56.55	-10.73	-5.93					
MB3YB7		C161	55.02	-10.72	-5.34	1.12	0.03	-0.15	1.13	GH
		C162	56.14	-10.70	-5.49					
NG9VU7		C161	54.73	-10.64	-5.61	1.15	0.03	-0.20	1.17	HK
		C162	55.88	-10.61	-5.81					
NWKY87		C161	54.89	-10.75	-5.45	1.17	0.06	-0.17	1.18	XU
		C162	56.05	-10.70	-5.62					
PJQAX7		C161	55.51	-10.70	-5.43	1.16	0.04	-0.18	1.17	XD
		C162	56.67	-10.66	-5.61					
PMZYK8		C161	54.82	-10.57	-5.60	1.04	-0.05	-0.14	1.05	XO
		C162	55.85	-10.62	-5.74					
QNXRJX		C161	54.92	-10.91	-5.32	1.11	0.03	-0.17	1.12	XR
		C162	56.02	-10.88	-5.49					
TKEEXZ		C161	55.03	-10.88	-5.30	1.02	0.04	-0.16	1.03	GB
		C162	56.05	-10.84	-5.46					
TKTBAF		C161	54.98	-10.59	-5.91	1.20	0.05	-0.18	1.21	HW
		C162	56.18	-10.55	-6.08					
UCBJ2T		C161	55.01	-10.46	-5.97	1.21	0.04	-0.16	1.22	HW
		C162	56.21	-10.42	-6.12					
UETQ83		C161	54.90	-10.56	-5.89	1.27	0.08	-0.18	1.28	HW
		C162	56.17	-10.49	-6.07					
UPZUV7		C161	55.87	-10.75	-5.43	1.05	0.00	-0.16	1.06	XZ
		C162	56.92	-10.75	-5.59					
URNVR2		C161	55.59	-10.72	-5.81	1.26	0.02	-0.16	1.27	AE
		C162	56.85	-10.70	-5.97					
VUNVEW		C161	55.10	-10.74	-5.62	1.13	0.07	-0.20	1.15	XO
		C162	56.23	-10.68	-5.82					

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			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
VWVLU8		C161	55.16	-10.95	-5.55	1.07	-0.01	-0.17	1.08	XZ
		C162	56.23	-10.96	-5.72					
W3XKRV		C161	54.91	-10.42	-5.95	1.19	0.04	-0.13	1.19	HW
		C162	56.09	-10.39	-6.08					
WC8JCD		C161	55.10	-10.76	-5.46	0.98	-0.02	-0.15	0.99	XM
		C162	56.08	-10.77	-5.60					
WGFYL2		C161	55.13	-10.82	-5.26	1.27	0.10	-0.18	1.28	GE
		C162	56.40	-10.72	-5.44					
XGNF4R		C161	54.93	-11.31	-5.44	1.14	0.04	-0.16	1.15	FA
		C162	56.07	-11.27	-5.59					
YABBAR		C161	55.05	-11.16	-5.53	1.14	0.10	-0.21	1.16	XZ
		C162	56.19	-11.06	-5.74					
YE668T		C161	55.37	-10.82	-5.73	1.17	0.05	-0.14	1.17	MU
		C162	56.54	-10.77	-5.87					
YTH8FN		C161	55.18	-10.55	-5.98	1.16	0.04	-0.16	1.17	HW
		C162	56.33	-10.51	-6.14					
ZAPNZV		C161	55.16	-10.65	-5.80	1.20	0.08	-0.16	1.21	XK
		C162	56.35	-10.57	-5.96					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
C161	55.06	-10.71	-5.65				
C162	56.20	-10.67	-5.81	1.14	0.04	-0.16	1.15
Stnd Dev Btwn Labs							
C161	0.26	0.19	0.21				
C162	0.26	0.18	0.21	0.08	0.03	0.02	0.08

Statistics based on 40 of 41 reporting participants

Comments Assigned on Data Flags for Test #408

EZPKZJ(X) - High "b*" values. Inconsistent in testing between the "a*" values for both samples.

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Key to Instrument Codes Reported by Participants

AB	Data Color	AE	ACS Chroma-Sensor CS-3
FA	BYK Mac	GB	BYK-Gardner spectro-guide sphere gloss
GE	BYK-Gardner spectro-guide (45/0)	GH	BYK-Gardner Color-View
HG	Hunter ColorQUEST	HK	Hunter MiniScan XE (45/0)
HW	Hunter LabScan XE	HY	Hunter Color Flex 45/0
MG	Macbeth 1500/PLUS or 2025+ Color Eye	MU	Minolta
TO	Topcon SR-3 Spectroradiometer	XD	X-Rite 500 Series SpectroDensitometer
XK	X-Rite MA100 Multi-Angle SpectroPhotometer	XM	X-Rite MA58 Multi-Angle SpectroPhotometer
XN	X-Rite MA68 Multi-Angle SpectroPhotometer	XO	X-Rite MA68 II Multi-Angle SpectroPhotometer
XR	X-Rite 968 Portable SpectroPhotometer	XU	X-Rite 964 Portable SpectroPhotometer
XZ	X-Rite		

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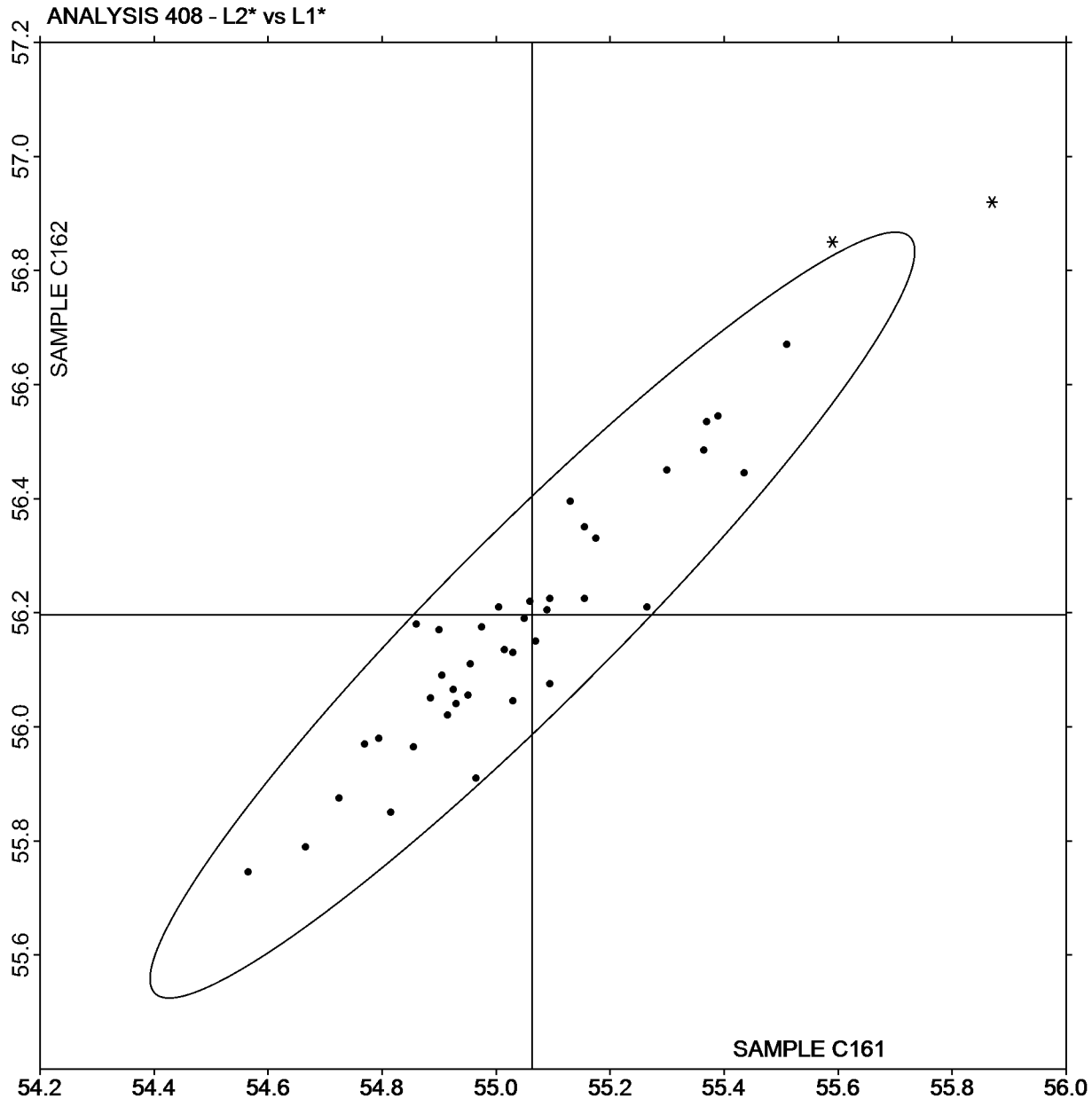
L2* vs L1*

SAMPLE C161 = 55.06 SAMPLE C162 = 56.20



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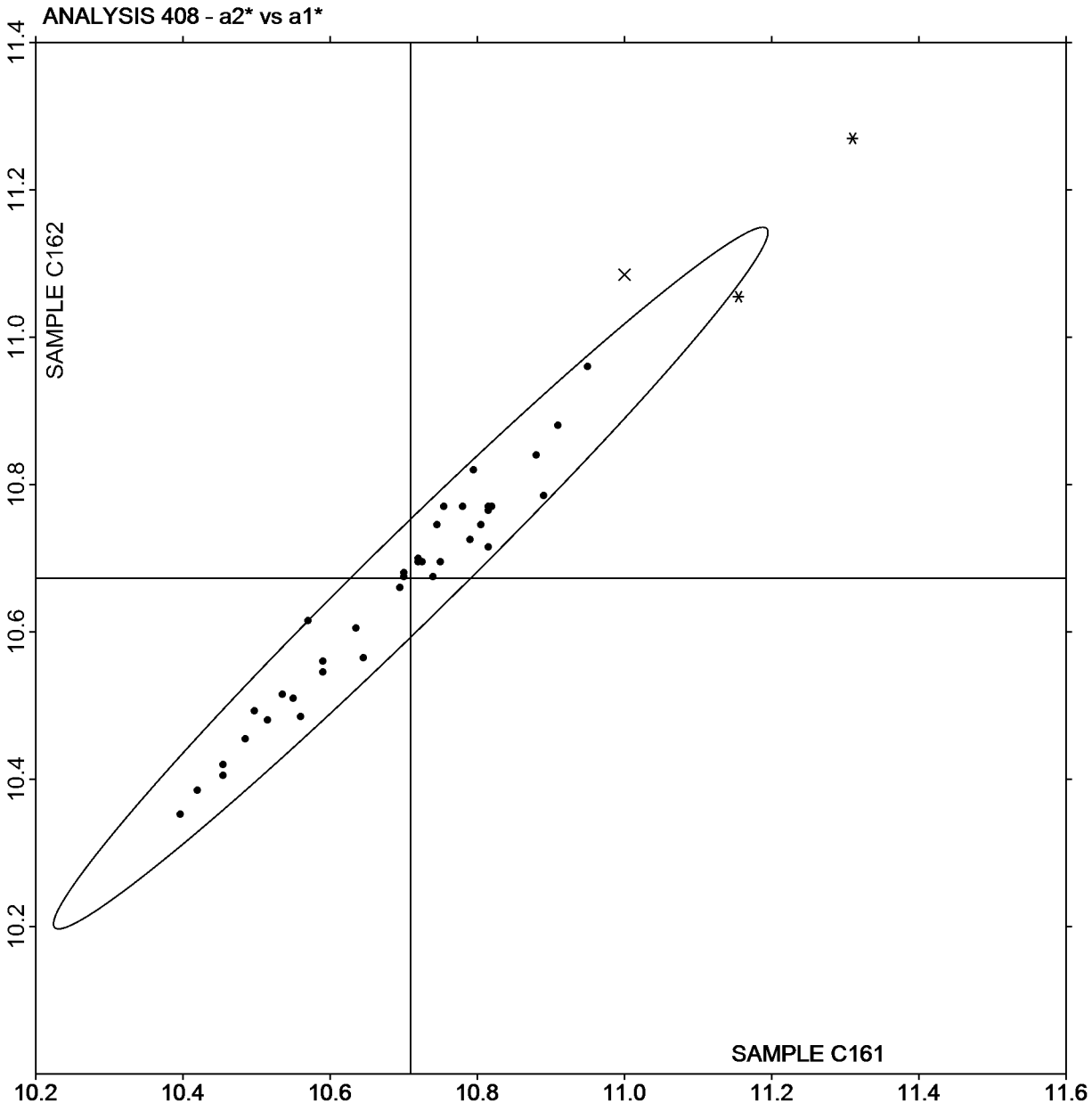
a2* vs a1*

SAMPLE C161 = -10.71 SAMPLE C162 = -10.67



Plot created using absolute values.

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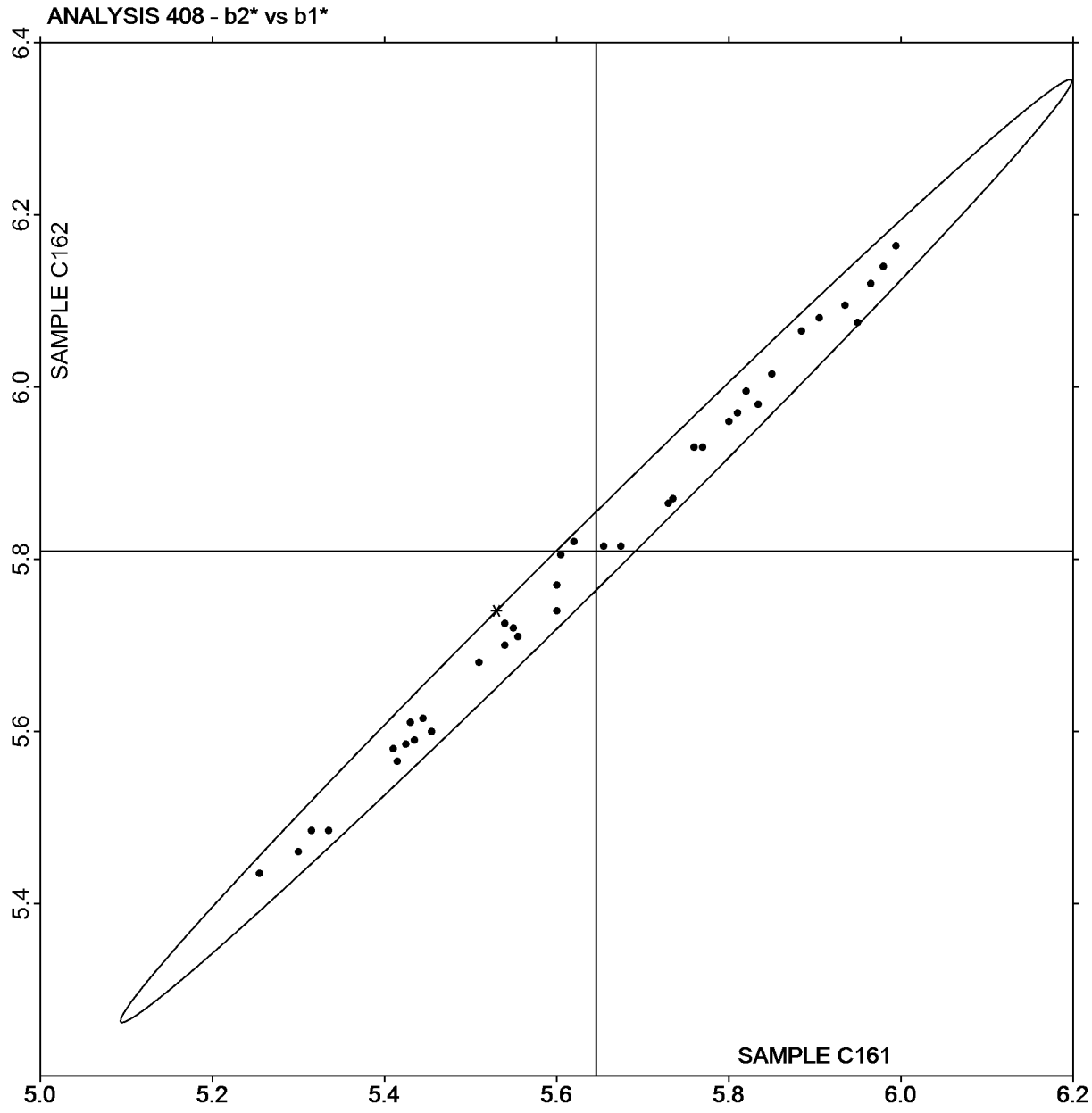
b2* vs b1*

SAMPLE C161 = -5.65 SAMPLE C162 = -5.81



Plot created using absolute values.

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			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
2B4UKV		C161 C162	55.01 56.01	-10.65 -10.62	-5.77 -5.93	1.01	0.03	-0.16	1.02	XM
363DRM		C161 C162	55.44 56.67	-10.80 -10.71	-5.75 -5.91	1.23	0.09	-0.17	1.24	MV
3BBCBM		C161 C162	55.00 56.24	-10.59 -10.51	-5.66 -5.82	1.24	0.08	-0.16	1.25	XH
3KWDQW		C161 C162	55.56 56.59	-10.68 -10.70	-5.78 -5.92	1.04	-0.02	-0.14	1.04	AO
3YWWQ9		C161 C162	55.32 56.46	-10.72 -10.70	-5.66 -5.81	1.14	0.03	-0.16	1.15	MM
43BLEV		C161 C162	55.45 56.43	-10.60 -10.59	-5.74 -5.89	0.99	0.02	-0.16	1.00	XI
4B9ACM		C161 C162	55.10 56.23	-10.66 -10.65	-5.71 -5.86	1.14	0.02	-0.15	1.14	XH
4DWQLU		C161 C162	55.40 56.43	-10.68 -10.68	-5.81 -5.97	1.04	-0.01	-0.16	1.05	XI
4G4T9P		C161 C162	55.46 56.61	-10.74 -10.68	-5.69 -5.85	1.16	0.06	-0.16	1.17	MM
62EVYM		C161 C162	55.44 56.63	-10.83 -10.77	-5.76 -5.92	1.20	0.06	-0.17	1.21	AJ
62XY7N		C161 C162	55.36 56.30	-10.63 -10.68	-5.75 -5.89	0.95	-0.05	-0.14	0.96	SH
6NPT3U	X	C161 C162	55.43 56.44	-10.69 -10.66	-10.66 -5.81	1.02	0.03	4.85	4.96	MM
6W8XFN		C161 C162	55.18 56.32	-10.76 -10.70	-5.75 -5.91	1.14	0.06	-0.17	1.15	XI
6XDR8Z		C161 C162	55.32 56.36	-10.50 -10.58	-5.77 -5.99	1.04	-0.08	-0.22	1.07	XM
74EQVV		C161 C162	55.42 56.56	-10.83 -10.77	-5.67 -5.85	1.15	0.06	-0.19	1.16	MV
74VCEQ		C161 C162	55.29 56.39	-10.59 -10.57	-5.66 -5.82	1.11	0.02	-0.17	1.12	XI

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			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
7CUUVN		C161 C162	54.99 56.03	-10.52 -10.55	-5.67 -5.84	1.04	-0.03	-0.17	1.05	XO
7DPQRR		C161 C162	55.22 56.37	-10.77 -10.77	-5.69 -5.88	1.15	-0.01	-0.19	1.16	MV
7GK66L		C161 C162	55.52 56.47	-10.59 -10.59	-5.64 -5.77	0.95	0.01	-0.13	0.96	XH
7Z3F6M		C161 C162	54.92 56.09	-10.77 -10.69	-5.85 -6.01	1.17	0.09	-0.16	1.18	GD
9G2F7L		C161 C162	55.46 56.49	-10.70 -10.71	-5.66 -5.82	1.03	-0.01	-0.16	1.04	AJ
9PVKYM		C161 C162	55.35 56.42	-10.68 -10.70	-5.76 -5.89	1.07	-0.02	-0.14	1.07	XI
9RFXQH	X	C161 C162	54.83 55.96	-9.42 -9.35	-6.73 -6.89	1.13	0.07	-0.16	1.14	AJ
9U4DZQ		C161 C162	55.62 56.78	-10.70 -10.68	-5.78 -5.92	1.16	0.02	-0.15	1.16	AO
9UMRGV	X	C161 C162	54.56 55.06	-10.72 -10.65	-5.76 -5.88	0.51	0.08	-0.12	0.52	CA
AEXFRP		C161 C162	55.34 56.43	-10.72 -10.67	-5.66 -5.82	1.09	0.05	-0.16	1.10	MM
ATHYME	X	C161 C162	53.37 54.71	-10.74 -10.64	-5.73 -5.92	1.34	0.10	-0.19	1.35	AJ
BA8G6M		C161 C162	55.27 56.44	-10.57 -10.58	-5.66 -5.81	1.18	-0.01	-0.15	1.18	XO
BNB9ZK		C161 C162	54.97 56.07	-10.54 -10.51	-5.69 -5.84	1.10	0.04	-0.15	1.11	XH
BNGAHD		C161 C162	55.01 56.15	-10.71 -10.65	-5.86 -6.01	1.14	0.06	-0.15	1.15	XM
BV8HGQ		C161 C162	54.94 56.26	-10.79 -10.67	-5.67 -5.85	1.32	0.12	-0.18	1.34	GD
C4JUAH		C161 C162	55.31 56.28	-10.59 -10.66	-5.78 -5.94	0.98	-0.07	-0.16	0.99	XH

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			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
CEF3QY		C161 C162	55.23 56.42	-10.73 -10.66	-5.70 -5.88	1.20	0.08	-0.18	1.21	XI
CQDDBK		C161 C162	55.44 56.46	-10.83 -10.89	-5.80 -5.95	1.02	-0.06	-0.15	1.03	HP
D2B2TN		C161 C162	55.43 56.62	-10.68 -10.59	-5.69 -5.86	1.20	0.09	-0.17	1.21	MM
D32YUK	X	C161 C162	40.69 39.53	-5.86 -6.03	-10.02 -9.98	-1.16	-0.17	0.04	1.18	MK
D6ZPYE		C161 C162	55.28 56.52	-10.83 -10.72	-5.85 -6.03	1.25	0.11	-0.18	1.26	AQ
DNVHKC		C161 C162	55.43 56.50	-10.64 -10.64	-5.67 -5.82	1.07	0.00	-0.15	1.08	MM
DQRECD		C161 C162	55.64 56.70	-10.63 -10.63	-5.80 -5.93	1.06	0.00	-0.13	1.07	AJ
E6MW2B		C161 C162	55.62 56.82	-10.82 -10.73	-5.80 -5.98	1.21	0.09	-0.18	1.22	AO
E7FGFG		C161 C162	55.31 56.48	-10.75 -10.69	-5.81 -5.98	1.17	0.06	-0.17	1.18	AQ
EEZYJ9	X	C161 C162	53.95 55.06	-8.07 -8.04	-7.91 -8.09	1.11	0.03	-0.18	1.12	AM
EGJCXM		C161 C162	55.28 56.47	-10.80 -10.77	-5.78 -5.95	1.19	0.03	-0.17	1.20	HP
EYWLRD		C161 C162	55.44 56.51	-10.69 -10.66	-5.76 -5.92	1.07	0.03	-0.16	1.08	MK
EZPKZJ		C161 C162	55.10 56.15	-10.61 -10.59	-5.70 -5.84	1.05	0.02	-0.14	1.06	XI
F8NWLM		C161 C162	55.20 56.37	-10.67 -10.65	-5.65 -5.80	1.17	0.02	-0.16	1.18	XH
FP6MDD		C161 C162	55.57 56.75	-10.91 -10.85	-5.63 -5.81	1.19	0.06	-0.18	1.20	AJ
G78YUN		C161 C162	55.61 56.75	-10.77 -10.78	-5.86 -6.01	1.14	-0.01	-0.15	1.14	AO

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			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
GN7EUE		C161	55.53	-10.81	-5.76	1.14	0.04	-0.16	1.15	AJ
		C162	56.66	-10.77	-5.91					
GVYVRH		C161	55.57	-10.79	-5.73	1.11	0.03	-0.17	1.12	AR
		C162	56.68	-10.76	-5.90					
H48MX7		C161	55.05	-10.58	-5.67	1.26	0.06	-0.15	1.27	AO
		C162	56.30	-10.52	-5.82					
H4VCH9		C161	55.35	-10.57	-5.55	1.15	0.06	-0.17	1.16	MM
		C162	56.49	-10.52	-5.72					
HA46Q6		C161	55.31	-10.70	-5.87	1.10	0.01	-0.17	1.11	HP
		C162	56.41	-10.69	-6.04					
HHGNUH		C161	55.53	-10.83	-5.67	1.12	0.03	-0.16	1.13	MV
		C162	56.65	-10.80	-5.83					
J7TQ64		C161	55.70	-10.75	-5.61	1.05	0.08	-0.14	1.06	MT
		C162	56.74	-10.67	-5.74					
JBDZWA		C161	54.88	-10.73	-5.76	1.23	0.06	-0.16	1.24	GD
		C162	56.11	-10.68	-5.91					
JGJTQ7		C161	55.32	-10.70	-5.63	1.26	0.08	-0.18	1.28	AM
		C162	56.58	-10.62	-5.81					
JNMHND		C161	55.01	-10.71	-5.57	1.11	0.02	-0.20	1.12	XH
		C162	56.12	-10.69	-5.76					
KER2CE		C161	55.46	-10.80	-5.69	1.12	0.03	-0.17	1.13	AL
		C162	56.58	-10.77	-5.86					
L4L4VC		C161	55.35	-10.50	-5.58	1.17	0.01	-0.19	1.18	AJ
		C162	56.51	-10.49	-5.76					
LBPFZ2		C161	55.12	-10.68	-5.72	1.27	0.08	-0.16	1.28	XO
		C162	56.39	-10.60	-5.87					
LCKY24		C161	55.61	-10.81	-5.75	1.21	0.07	-0.17	1.22	AJ
		C162	56.82	-10.74	-5.91					
LJ2EUD		C161	55.57	-10.67	-5.74	1.15	0.04	-0.17	1.16	AO
		C162	56.72	-10.63	-5.91					
LQQYAD		C161	54.68	-10.76	-5.48	1.16	0.06	-0.16	1.17	XO
		C162	55.83	-10.70	-5.64					

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			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
M3BWG3		C161	55.72	-10.76	-5.79	1.17	0.06	-0.17	1.18	AM
		C162	56.89	-10.70	-5.95					
MN9VU9		C161	55.37	-10.77	-5.67	1.05	0.01	-0.16	1.06	MM
		C162	56.42	-10.76	-5.83					
MT4EH6		C161	55.39	-10.78	-5.66	1.21	0.08	-0.15	1.22	AM
		C162	56.59	-10.70	-5.81					
N8XT96		C161	55.49	-10.79	-5.78	1.02	-0.04	-0.15	1.03	XX
		C162	56.50	-10.82	-5.93					
NWKY87		C161	55.32	-10.78	-5.62	1.20	0.11	-0.17	1.22	XI
		C162	56.52	-10.67	-5.78					
NZWELH	X	C161	54.96	-10.37	-5.61	1.06	0.05	-0.22	1.08	MG
		C162	56.02	-10.32	-5.83					
PDHL84		C161	55.44	-10.90	-5.64	1.21	0.06	-0.18	1.22	AM
		C162	56.65	-10.84	-5.82					
QKHRDD		C161	55.28	-10.90	-5.62	1.20	0.06	-0.17	1.21	PE
		C162	56.47	-10.84	-5.79					
QMXDM7		C161	55.33	-10.90	-5.53	1.22	0.08	-0.18	1.23	XX
		C162	56.55	-10.83	-5.71					
QTAVAY		C161	55.29	-10.70	-5.78	1.08	0.01	-0.18	1.09	XI
		C162	56.37	-10.69	-5.96					
R4WZDV	X	C161	55.10	-10.20	-6.66	1.09	0.06	-0.14	1.10	MU
		C162	56.18	-10.15	-6.80					
RGV3FX		C161	55.27	-10.69	-5.85	1.19	0.04	-0.16	1.20	XI
		C162	56.46	-10.65	-6.01					
RHHFFV		C161	55.51	-10.78	-5.67	1.21	0.04	-0.16	1.22	AQ
		C162	56.71	-10.74	-5.83					
RLNW47		C161	55.51	-10.78	-5.69	1.05	-0.01	-0.16	1.06	AJ
		C162	56.55	-10.79	-5.85					
TBK2K2		C161	55.61	-10.78	-5.76	1.00	-0.01	-0.14	1.00	AS
		C162	56.61	-10.79	-5.90					
THDHH6	X	C161	54.88	-11.22	-6.68	1.09	0.02	-0.18	1.10	XZ
		C162	55.97	-11.20	-6.85					

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			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
TXFHA2		C161 C162	55.51 56.76	-10.68 -10.61	-5.94 -6.03	1.25	0.08	-0.09	1.26	AM
UDPJ6V	X	C161 C162	55.40 56.58	-10.57 -10.55	-6.08 -6.13	1.19	0.03	-0.05	1.19	HG
UDX862		C161 C162	55.43 56.77	-10.76 -10.60	-5.79 -5.99	1.34	0.16	-0.20	1.36	AJ
UHFTFT		C161 C162	55.41 56.56	-10.74 -10.69	-5.83 -5.99	1.15	0.05	-0.16	1.16	XI
UYLX37	X	C161 C162	55.57 56.68	-10.45 -10.34	-5.98 -6.13	1.12	0.11	-0.16	1.13	HH
V76HMX		C161 C162	55.55 56.69	-10.54 -10.53	-5.66 -5.85	1.14	0.01	-0.20	1.16	HF
VHW6XY	X	C161 C162	55.04 56.30	-11.08 -10.97	-5.66 -5.82	1.26	0.11	-0.16	1.27	GD
VJ44N2		C161 C162	55.49 56.58	-10.81 -10.80	-5.76 -5.90	1.10	0.01	-0.15	1.10	AS
VQ8YY2	X	C161 C162	58.81 60.05	-11.07 -11.04	-6.80 -6.99	1.25	0.03	-0.19	1.26	XI
VUNVEW		C161 C162	55.23 56.34	-10.71 -10.66	-5.74 -5.90	1.11	0.05	-0.16	1.12	MI
VY6Q8V		C161 C162	55.35 56.52	-10.74 -10.68	-5.80 -5.97	1.17	0.06	-0.17	1.18	HP
W3E4PU		C161 C162	55.59 56.73	-10.63 -10.56	-5.62 -5.78	1.14	0.07	-0.16	1.15	XI
W989GD		C161 C162	55.11 56.12	-10.60 -10.61	-5.64 -5.79	1.01	-0.02	-0.16	1.02	XH
WAM48V		C161 C162	55.10 56.30	-10.70 -10.63	-5.83 -5.98	1.20	0.07	-0.16	1.21	XM
WJMQ4V		C161 C162	55.46 56.55	-10.77 -10.77	-5.72 -5.88	1.10	0.00	-0.16	1.11	MV
WNY6H9		C161 C162	55.50 56.60	-10.59 -10.57	-5.61 -5.77	1.10	0.02	-0.16	1.11	MM

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			CIE L* a* b* Color Values			Color Difference Values				
WebCode	Flag	Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*	InstrCode
X9JW43		C161	55.47	-10.56	-5.80	1.03	-0.03	-0.16	1.04	XI
		C162	56.50	-10.59	-5.96					
XK4BJP		C161	55.50	-10.51	-5.96	1.13	0.04	-0.16	1.14	HH
		C162	56.63	-10.47	-6.12					
XP3K44		C161	55.48	-10.64	-5.97	1.17	0.04	-0.16	1.18	AM
		C162	56.65	-10.61	-6.13					
XWGBDX	X	C161	55.66	-11.01	-5.84	1.05	0.01	-0.16	1.06	CA
		C162	56.70	-11.00	-6.00					
YGTLG2		C161	55.27	-10.71	-5.64	1.23	0.09	-0.17	1.24	XI
		C162	56.50	-10.63	-5.80					
Z6E7UT		C161	55.19	-10.73	-5.73	1.14	0.02	-0.17	1.15	XI
		C162	56.33	-10.71	-5.90					
Z8FJM8		C161	55.69	-10.81	-5.75	1.06	-0.01	-0.16	1.07	AO
		C162	56.74	-10.82	-5.91					
ZAPNZV		C161	55.58	-10.88	-5.81	1.13	0.03	-0.16	1.14	AO
		C162	56.71	-10.85	-5.97					
ZGMF9P		C161	55.11	-10.57	-5.75	1.12	0.02	-0.16	1.13	XH
		C162	56.22	-10.55	-5.91					
ZLFHA4		C161	55.40	-10.77	-5.70	1.08	0.04	-0.17	1.09	MU
		C162	56.48	-10.73	-5.87					

Summary Statistics

Samples	L*	a*	b*	ΔL*	Δa*	Δb*	ΔE*
Grand Means							
C161	55.34	-10.71	-5.72				
C162	56.46	-10.67	-5.88	1.13	0.03	-0.16	1.14
Stnd Dev Btwn Labs							
C161	0.22	0.10	0.09				
C162	0.22	0.09	0.09	0.08	0.04	0.02	0.08

Statistics based on 92 of 106 reporting participants

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Comments Assigned on Data Flags for Test #409

6NPT3U(X) - Low "b*" value for Sample C161, possible typo.
9RFXQH(X) - High "a*" values and low "b*" values.
9UMRGV(X) - Low "L*" values. Inconsistent in testing between the "b*" values for both samples.
ATHYME(X) - Low "L*" values.
D32YUK(X) - Low "L*" and "b*" values. High "a*" values
EEZYJ9(X) - High "a*" values and low "L*" and "b*" values.
NZWELH(X) - High "a*" values. Inconsistent in testing within the "b*" values for both samples.
R4WZDV(X) - High "a*" values and low "b*" values.
THDHH6(X) - Low "a*" and "b*" values.
UDPJ6V(X) - Low "b*" values.
UYLX37(X) - Low "b*" values. High "a*" value for Sample C162.
VHW6XY(X) - Low "a*" values.
VQ8YY2(X) - High "L*" values. Low "a*" and "b*" values.
XWGBDX(X) - Low "a*" values.

Key to Instrument Codes Reported by Participants

AJ	ACS-Datacolor 600	AL	ACS-Datacolor Intl. Dataflash 100
AM	ACS-Datacolor 600 Plus	AO	ACS-Datacolor 650X
AQ	ACS-Datacolor 600X	AR	Datacolor 400
AS	ACS-Datacolor 800 Series	CA	Cary 5000
GD	BYK-Gardner spectro-guide sphere	HF	Hunter ColorFlex Diffuse
HG	Hunter ColorQUEST	HH	Hunter ColorQUEST XE
HP	Hunter UltraScan PRO	MG	Macbeth 2180 Color Eye
MI	Macbeth Color i 5	MK	Macbeth Color-Eye 7000
MM	Macbeth Color-Eye 7000a	MT	Minolta CM-2600d
MU	Minolta	MV	Minolta CM-3000d Series Spectrophotometer
PE	Perkin Elmer Spectrophotometer	SH	SIMADZU UV 3101PC
XH	X-Rite Color i5	XI	X-Rite Color i7
XM	X-Rite SP62 Portable Sphere Spectrophotometer	XO	X-Rite SP64 Portable Sphere Spectrophotometer
XX	Instrument make/model not specified by lab	XZ	X-Rite

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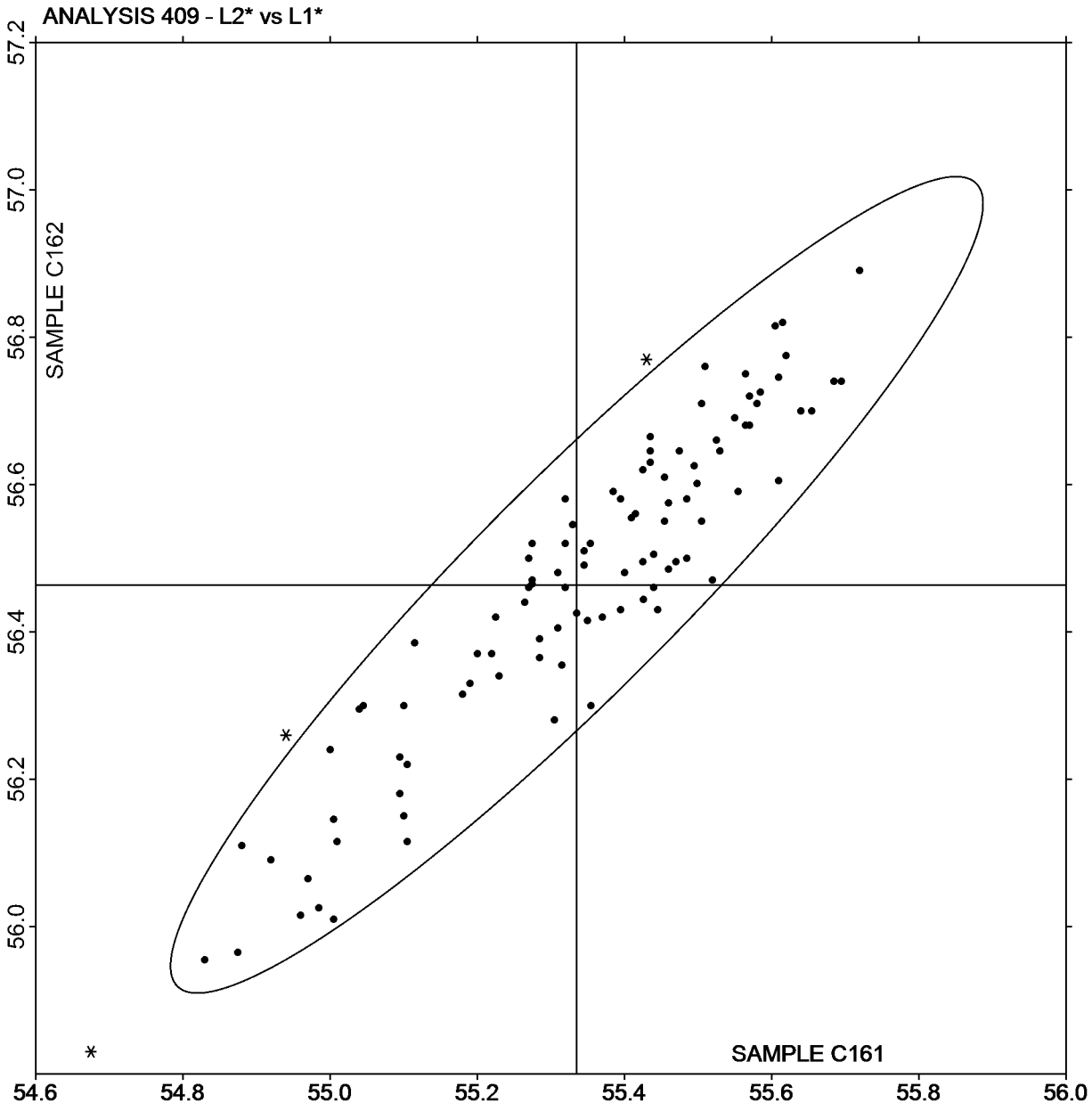
L2* vs L1*

SAMPLE C161 = 55.34 SAMPLE C162 = 56.46



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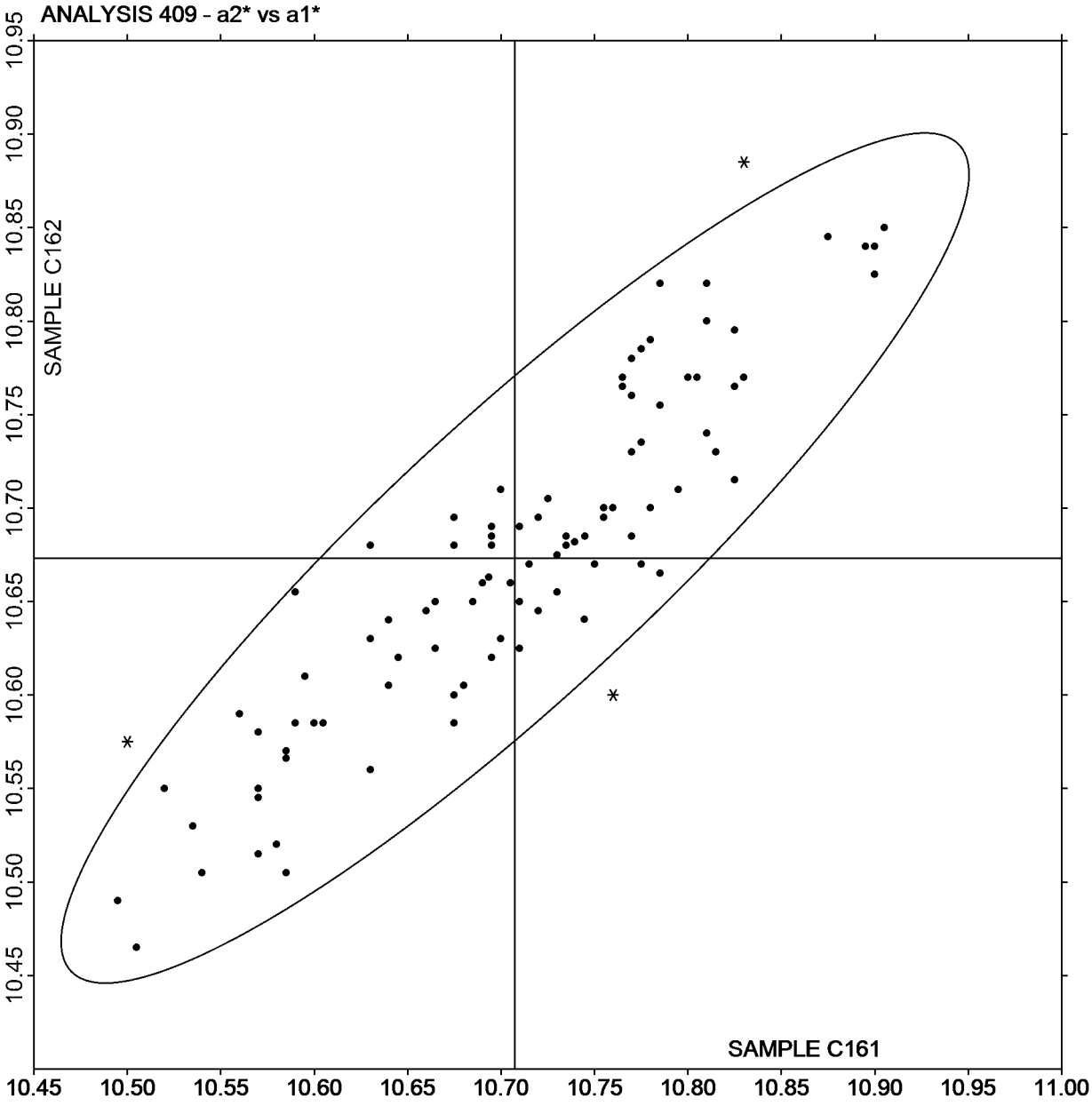
a2* vs a1*

SAMPLE C161 = -10.71 SAMPLE C162 = -10.67



Plot created using absolute values.

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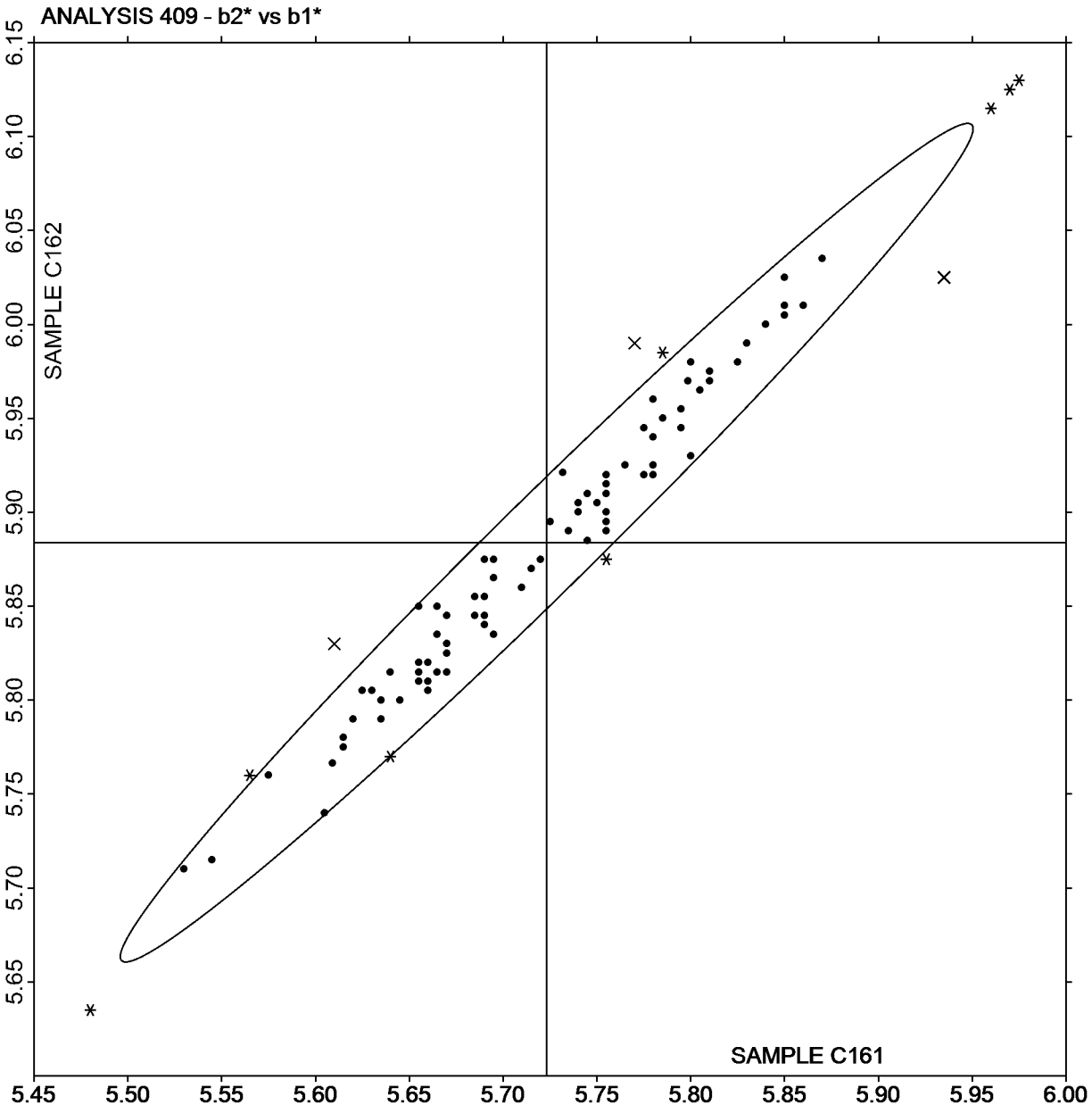
b2* vs b1*

SAMPLE C161 = -5.72

SAMPLE C162 = -5.88



Plot created using absolute values.

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Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample C161																		
363DRM		19.71	24.12	26.49	27.77	27.77	28.30	28.46	26.52	21.79	18.61	17.47	17.10	19.14	20.66	19.31	18.13	MV
3BBCBM		19.17	23.58	25.89	27.26	27.35	27.73	27.88	25.89	21.43	18.37	17.15	16.99	18.84	20.15	18.91	17.93	XH
3KWDQW		19.77	23.95	26.25	27.59	27.70	28.18	28.25	26.24	21.76	18.66	17.51	17.24	19.16	20.43	19.17	18.14	XI
3YWWQ9		19.68	23.86	26.25	27.56	27.67	28.13	28.25	26.29	21.77	18.61	17.41	17.17	19.08	20.46	19.17	18.13	MM
43BLEV		19.74	24.11	26.46	27.76	27.85	28.30	28.38	26.35	21.86	18.73	17.53	17.30	19.21	20.42	19.07	18.14	XI
4B9ACM		19.39	23.68	25.98	27.37	27.49	27.86	28.01	26.00	21.46	18.43	17.23	17.04	18.96	20.23	18.87	17.91	XH
4DWQLU		19.98	24.07	26.41	27.71	27.81	28.31	28.32	26.32	21.76	18.68	17.48	17.20	19.12	20.50	19.22	18.25	XI
4G4T9P		19.91	24.02	26.43	27.72	27.80	28.28	28.41	26.43	21.90	18.72	17.50	17.26	19.16	20.54	19.25	18.20	MM
62EVYM		19.77	24.08	26.43	27.68	27.85	28.26	28.40	26.45	21.86	18.63	17.48	17.11	19.03	20.41	18.74	17.97	AJ
62XY7N		19.93	23.98	26.45	27.59	27.62	28.15	28.33	26.32	21.73	18.63	17.52	17.08	19.00	20.53	19.28	18.00	SH
6NPT3U		19.71	23.94	26.39	27.70	27.78	28.24	28.38	26.41	21.87	18.70	17.48	17.20	19.11	20.51	19.28	18.16	MM
6W8XFN		19.65	23.87	26.12	27.46	27.52	28.00	28.10	26.11	21.62	18.53	17.29	16.98	18.81	20.13	18.93	18.00	XI
6XDR8Z		20.66	24.17	26.65	27.82	27.90	28.39	28.41	26.31	21.80	18.80	17.61	17.22	19.54X	21.00	19.53	18.35	HW
74EQVV		19.53	24.05	26.37	27.71	27.73	28.25	28.42	26.50	21.79	18.61	17.44	17.11	19.04	20.60	19.35	18.12	MV
74VCEQ		19.57	23.85	26.18	27.57	27.62	28.06	28.16	26.19	21.74	18.63	17.43	17.20	19.14	20.43	19.03	18.13	XI
7CUUVN		19.58	23.55	25.99	27.11	27.33	27.65	27.98	25.93	21.29	18.26	17.16	17.01	18.95	20.19	18.93	17.82	XO
9PVKYM		19.86	23.99	26.37	27.62	27.74	28.15	28.29	26.31	21.75	18.62	17.43	17.18	19.11	20.42	19.10	18.09	XI
9RFXQH		19.53	23.88	26.26	27.55	27.72	28.12	28.25	26.30	21.77	18.52	17.36	17.01	18.85	20.28	19.16	18.14	AJ
9U4DZQ		19.95	24.20	26.70	27.90	28.10	28.50	28.65	26.60	22.00	18.80	17.70	17.30	19.20	20.70	18.95	18.00	AO
9UMRGV		19.26	23.05X	25.51X	26.75X	26.78X	27.32X	27.47X	25.51X	21.00X	17.93X	16.83X	16.43X	18.40X	19.83	18.56	17.33	CA
AEXFRP		19.78	23.88	26.26	27.54	27.69	28.14	28.24	26.27	21.81	18.64	17.42	17.17	19.00	20.38	19.17	18.15	MM
ATHYME	X	18.19X	22.04X	24.34X	25.47X	25.64X	26.04X	26.18X	24.30X	19.95X	16.95X	15.89X	15.56X	17.37X	18.66X	17.23X	16.38X	AJ
BA8G6M		19.78	23.83	26.19	27.49	27.57	28.01	28.23	26.19	21.62	18.62	17.43	17.12	19.11	20.38	19.16	18.03	XO
BNB9ZK		19.28	23.64	25.87	27.20	27.30	27.74	27.81	25.81	21.38	18.37	17.21	16.97	18.89	20.16	18.69	17.81	XH
BNGAHD		19.33	23.69	26.03	27.29	27.40	27.91	27.99	25.95	21.38	18.31	17.14	16.93	18.90	20.19	18.99	17.75	XM

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Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
							Sample C161											
BV8HGQ		20.27	23.51	26.05	27.12	27.19	27.19X	28.15	26.00	21.24	18.34	16.89	16.35X	18.82	20.20	19.22	18.10	GD
C4JUAH		19.75	24.09	26.31	27.63	27.66	28.09	28.19	26.27	21.81	18.63	17.44	17.15	18.99	20.33	19.18	18.16	XH
CEF3QY		19.54	23.79	26.16	27.48	27.58	28.06	28.16	26.15	21.63	18.51	17.33	17.10	19.05	20.27	18.87	17.96	XI
CQDDBK		20.28	24.12	26.50	27.78	27.87	28.35	28.45	26.40	21.88	18.65	17.48	17.07	18.94	20.37	19.14	17.86	HP
D2B2TN		19.90	24.05	25.91	27.65	27.79	28.23	28.36	26.37	21.87	18.69	17.53	17.27	19.14	20.55	19.29	18.20	MM
D32YUK		19.79	23.95	26.36	27.60	27.70	28.16	28.26	26.28	21.76	18.62	17.41	17.14	19.05	20.42	19.16	18.08	MK
DNVHKC		19.94	24.01	26.39	27.69	27.76	28.23	28.34	26.38	21.87	18.70	17.50	17.23	19.13	20.51	19.21	18.17	MM
DQRECD		20.10	24.30	26.70	27.75	28.10	28.50	28.60	26.60	22.00	18.90	17.40	17.30	19.30	20.65	19.00	18.20	AJ
E6MW2B		19.91	24.29	26.60	27.94	28.07	28.46	28.58	26.62	22.05	18.81	17.62	17.23	19.15	20.54	19.39	18.32	AO
E7FGFG		19.67	23.91	26.38	27.62	27.79	28.19	28.27	26.24	21.70	18.56	17.41	17.09	18.96	20.34	19.04	18.07	AQ
EEZYJ9		20.64	24.00	26.40	27.68	27.85	28.26	28.38	26.44	21.84	18.68	17.52	17.18	19.04	20.38	19.11	18.23	AM
EGJCXM		20.03	23.91	26.35	27.54	27.62	28.05	28.21	26.24	21.72	18.56	17.34	16.90	18.84	20.57	19.09	17.84	HP
EYWLRD		19.90	24.05	26.46	27.74	27.84	28.30	28.38	26.38	21.85	18.72	17.49	17.23	19.15	20.55	19.26	18.15	MK
EZPKZJ		19.48	23.76	26.02	27.30	27.45	27.85	27.98	26.01	21.50	18.41	17.31	17.05	18.94	20.21	18.83	17.91	XI
F8NWLM		19.42	23.71	26.10	27.44	27.55	27.99	28.12	26.11	21.62	18.54	17.30	17.15	19.03	20.29	19.03	18.09	XH
FP6MDD		19.88	24.04	26.49	27.76	27.97	28.40	28.57	26.61	21.98	18.76	17.56	17.27	19.14	20.51	19.19	18.25	AJ
G78YUN		19.78	24.35	26.73	27.90	28.08	28.47	28.58	26.64	22.00	18.82	17.62	17.25	19.17	20.50	18.88	17.94	AO
GN7EUE		19.83	24.12	26.52	27.79	27.97	28.43	28.51	26.53	21.91	18.74	17.57	17.25	19.16	20.53	18.77	17.93	AJ
H48MX7		19.16	23.66	25.99	27.25	27.46	27.86	27.88	25.95	21.46	18.38	17.24	17.01	18.90	20.28	18.33X	17.45	AO
H4VCH9		19.69	23.90	26.25	27.53	27.63	28.09	28.17	26.25	21.88	18.73	17.48	17.24	19.01	20.35	19.30	18.23	MM
HA46Q6		20.50	24.06	26.45	27.64	27.72	28.18	28.31	26.25	21.76	18.53	17.41	17.04	19.00	20.63	19.13	17.99	HP
HHGNUH		19.65	24.13	26.48	27.84	27.90	28.41	28.57	26.54	21.93	18.71	17.57	17.18	19.21	20.72	19.39	18.19	MV
J7TQ64		19.64	24.14	26.64	28.00	28.04	28.53	28.70	26.69	22.14	18.89	17.72	17.35	19.31	20.82	19.50	18.38	MT
JBDZWA		21.10	23.42	25.86	27.19	27.24	27.58	27.74	25.59X	21.43	18.24	16.77X	16.72	18.77	19.97	19.28	16.07X	GD
JGJTQ7		19.49	23.87	26.22	27.53	27.66	28.13	28.20	26.26	21.80	18.64	17.45	17.19	19.01	20.39	19.07	17.98	AM

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Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
								Sample C161										
JNMHND		19.02	23.51	25.80	27.20	27.30	27.74	27.90	25.90	21.49	18.43	17.15	16.91	18.79	20.19	18.93	17.92	XH
KER2CE		19.72	24.05	26.41	27.72	27.86	28.29	28.42	26.43	21.91	18.70	17.52	17.19	19.02	20.55	19.29	18.01	AL
L4L4VC		19.55	23.91	26.25	27.52	27.71	28.12	28.16	26.21	21.82	18.70	17.51	17.30	19.10	20.31	19.15	18.26	AJ
LBPFZ2		19.66	23.72	26.13	27.36	27.51	27.91	28.13	26.07	21.51	18.37	17.22	17.02	18.93	20.25	19.03	17.85	XO
LCKY24		21.17	24.17	26.67	27.83	28.04	28.46	28.60	26.64	22.03	18.78	17.64	17.31	19.19	20.57	19.22	18.36	AJ
LJ2EUD		20.00	24.20	26.60	27.80	28.00	28.40	28.55	26.50	21.95	18.80	17.70	17.30	19.20	20.80	19.00	18.00	AO
LQQYAD		18.99	23.26	25.35X	26.77X	26.98X	27.37X	27.56X	25.69	21.07X	18.04X	16.93	16.66	18.52X	19.90	18.70	17.44	XO
M3BWG3		19.95	24.32	26.80	28.00	28.15	28.60	28.70	26.76	22.07	18.92	17.72	17.40	19.33	20.71	19.14	17.91	AM
MN9VU9		19.94	23.91	26.29	27.59	27.73	28.17	28.34	26.36	21.76	18.63	17.45	17.17	19.14	20.44	18.98	18.08	MM
MT4EH6		19.76	24.00	26.33	27.55	27.75	28.17	28.29	26.40	21.82	18.65	17.45	17.11	18.99	20.37	19.06	18.20	AM
N8XT96		19.91	24.10	26.51	27.77	27.91	28.30	28.47	26.49	21.94	18.70	17.54	17.19	19.07	20.41	19.08	18.22	XX
NWKY87		19.56	23.83	26.19	27.55	27.61	28.11	28.23	26.28	21.78	18.64	17.42	17.12	18.94	20.30	19.10	18.19	XI
NZWELH		19.62	23.54	25.91	27.14	27.16	27.66	27.81	25.77	21.41	18.44	17.20	16.93	18.95	20.26	18.89	18.11	MG
PDHL84		19.54	24.01	26.39	27.70	27.81	28.28	28.43	26.51	21.91	18.67	17.48	17.09	18.97	20.44	19.14	17.94	AM
QKHRDD		19.77	23.76	26.20	27.52	27.58	28.10	28.29	26.31	21.64	18.47	17.38	16.97	18.94	20.46	19.15	17.95	PE
QMXDM7		19.14	23.83	26.11	27.59	27.60	28.08	28.29	26.43	21.76	18.52	17.36	16.99	18.94	20.51	19.29	18.00	XX
QTAVAY		20.05	23.94	26.32	27.56	27.65	28.12	28.21	26.24	21.67	18.56	17.37	17.11	19.04	20.38	19.03	17.98	XI
R4WZDV		19.60	24.15	26.50	27.50	27.90	28.35	28.50	26.70	21.80	18.60	17.50	17.20	19.20	20.50	19.30	18.00	MU
RGV3FX		19.76	23.95	26.34	27.61	27.71	28.15	28.18	26.19	21.67	18.54	17.37	17.12	19.01	20.28	18.78	17.96	XI
RHHFFV		21.25	24.10	26.45	27.74	27.88	28.34	28.50	26.48	21.94	18.74	17.57	17.22	19.14	20.58	19.21	18.26	AQ
RLNW47		19.90	24.05	26.46	27.74	27.93	28.36	28.49	26.48	21.90	18.75	17.58	17.27	19.14	20.65	18.72	18.00	AJ
TBK2K2		19.90	24.22	26.65	27.85	28.04	28.51	28.59	26.61	22.00	18.81	17.64	17.30	19.21	20.71	18.84	18.02	AM
THDHH6		18.02X	23.60	26.04	27.62	27.74	28.34	28.50	26.60	21.93	18.73	17.56	17.23	19.13	20.64	19.47	18.35	XZ
TXFHA2		20.58	24.46	26.81	27.76	28.01	28.36	28.46	26.46	21.88	18.80	17.55	17.15	19.04	20.44	19.23	18.40	AM
UDPJ6V		19.72	24.88X	26.37	27.77	27.90	28.38	28.35	26.38	21.87	18.67	17.44	17.07	18.98	20.26	19.03	18.12	HG

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Spectrophotometric Reflectance values (as %) at selected wavelengths

WebCode	Data Flag	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	Instr Code
Sample C161																		
UDX862		20.74	24.11	26.44	27.69	27.85	28.26	28.43	26.38	21.86	18.68	17.48	17.18	19.04	20.44	19.19	18.26	AJ
UHFTFT		19.74	24.14	26.40	27.76	27.87	28.28	28.38	26.32	21.82	18.68	17.44	17.19	19.10	20.43	19.00	18.07	XI
UYLX37		20.31	24.32	26.95	27.92	28.00	28.43	28.54	26.47	21.93	18.70	17.61	15.71X	19.47	21.32X	19.38	18.04	HH
V76HMX		20.30	24.44	26.53	27.72	27.91	28.38	28.46	26.43	22.01	18.92	17.60	17.31	19.25	20.75	19.50	18.91X	HF
VHW6XY		22.37X	23.27	25.95	27.30	27.36	27.98	27.87	26.27	21.55	18.45	16.37X	16.46X	18.81	20.43	19.33	18.25	GD
VJ44N2		20.53	24.02	26.51	27.72	27.95	28.37	28.50	26.48	21.85	18.68	17.54	17.19	19.11	20.59	18.82	18.31	AM
VQ8YY2	X	4.18X	4.12X	4.14X	4.13X	4.14X	4.06X	4.01X	3.98X	3.96X	3.97X	3.94X	3.92X	3.97X	3.99X	4.00X	4.11X	XI
VUNVEW		19.43	23.90	26.18	27.51	27.57	28.09	28.17	26.16	21.62	18.55	17.33	17.09	18.98	20.30	19.03	18.06	MI
VY6Q8V		20.44	24.00	26.34	27.67	27.67	28.15	28.25	26.28	21.78	18.61	17.48	16.92	18.84	20.50	19.09	17.94	HP
W3E4PU		19.66	24.12	26.50	27.85	27.90	28.39	28.50	26.55	22.00	18.86	17.71	17.44	19.24	20.72	19.27	18.27	XI
W989GD		19.58	23.66	25.99	27.33	27.44	27.80	27.93	26.00	21.62	18.47	17.29	17.03	18.99	20.17	18.97	17.96	XH
WAM48V		19.39	23.76	26.11	27.38	27.48	27.98	28.07	26.03	21.45	18.37	17.20	17.00	18.97	20.25	19.04	17.80	XM
WJMQ4V	X	21.16	24.79X	27.08	28.44X	28.43	28.90	29.08X	27.17X	22.37X	19.08	17.92	17.56	19.60X	21.15X	19.76X	18.62	MV
WNY6H9		19.81	24.06	26.44	27.75	27.81	28.29	28.33	26.44	21.99	18.82	17.59	17.32	19.14	20.53	19.34	18.28	MM
X9JW43		20.03	24.15	26.51	27.78	27.86	28.32	28.37	26.35	21.87	18.76	17.57	17.34	19.28	20.52	19.13	18.19	XI
XK4BJP		20.25	24.23	26.86	27.86	27.91	28.34	28.48	26.42	21.86	18.79	17.55	17.14	19.38	21.24X	19.31	17.95	HH
XP3K44		19.85	24.40	26.67	27.84	27.95	28.39	28.47	26.40	21.83	18.72	17.54	17.25	19.18	20.35	19.12	17.87	AM
XWGBDX		20.16	24.29	26.68	28.10	28.10	28.57	28.78	26.80	22.09	18.83	17.67	17.24	19.26	20.78	19.49	18.25	CA
YGTLG2		19.69	23.90	26.22	27.44	27.61	28.06	28.19	26.21	21.74	18.58	17.35	17.01	19.04	20.43	19.01	18.08	XI
Z6E7UT		19.59	23.75	26.19	27.46	27.55	28.06	28.10	26.11	21.62	18.47	17.29	17.06	19.01	20.27	18.88	17.92	XI
Z8FJM8		20.06	24.21	26.69	27.97	28.16	28.60	28.67	26.68	22.07	18.90	17.71	17.31	19.27	20.68	18.93	17.94	AO
ZAPNZV		19.89	24.23	26.63	27.87	28.04	28.45	28.55	26.62	21.99	18.73	17.55	17.21	19.09	20.45	19.17	18.22	AO
ZGMF9P		19.53	23.84	26.08	27.34	27.45	27.90	27.95	25.96	21.59	18.44	17.23	17.08	19.00	20.24	18.81	17.92	XH
ZLFHA4		19.62	24.10	26.33	27.72	27.76	28.21	28.45	26.42	21.78	18.58	17.47	17.10	19.11	20.63	19.29	18.12	MV

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Summary Statistics

	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Grand Means	19.84	23.96	26.32	27.60	27.72	28.16	28.29	26.31	21.76	18.62	17.42	17.10	19.05	20.45	19.10	18.05
Stnd Dev Btwn Labs	0.53	0.28	0.28	0.25	0.26	0.27	0.25	0.25	0.22	0.18	0.21	0.23	0.17	0.23	0.22	0.29

Comments Assigned on Data Flags for Test #411

ATHYME (X) - Low % reflectance data at all wavelengths.

VQ8YY2 (X) - Low % reflectance data at all wavelengths.

WJMQ4V (X) - High % reflectance data at some wavelengths. Inconsistent in testing within most wavelengths.

Key to Instrument Codes Reported by Participants

AJ	ACS-Datacolor 600	AL	ACS-Datacolor Intl. Dataflash 100	AM	ACS-Datacolor 600 Plus
AO	ACS-Datacolor 650	AQ	ACS-Datacolor 600X	CA	Cary 5000
GD	BYK-Gardner spectro-guide sphere	HF	Hunter ColorFlex Diffuse	HG	Hunter ColorQUEST
HH	Hunter ColorQUEST XE	HP	Hunter UltraScan PRO	HW	Hunter UltraScan XE
MG	Macbeth 2180 Color Eye	MI	Macbeth Color i5	MK	Macbeth Color-Eye 7000 Spectrophotometer
MM	Macbeth Color-Eye 7000a	MT	Minolta CM-2600d	MU	Minolta
MV	Minolta CM-3000d Series Spectrophotometer	PE	Perkin Elmer Spectrophotometer	SH	SIMADZU UV 3101PC
XH	X-Rite Color i5	XI	X-Rite Color i7	XM	X-Rite SP62
XO	X-Rite SP64	XX	Instrument make/model not specified by lab	XZ	X-Rite

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Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample G161 Lab Mean	Sample G161 Difference from Grand Mean	Sample G161 Comparative Performance Value	Sample G162 Lab Mean	Sample G162 Difference from Grand Mean	Sample G162 Comparative Performance Value	Instr Code
29NBRT		58.00	0.10	0.19	69.83	0.54	1.20	GK
2LFARP		58.13	0.23	0.44	69.68	0.39	0.87	GL
3BBCBM		57.65	-0.25	-0.48	69.43	0.14	0.31	GL
3YWWQ9		58.13	0.23	0.44	69.93	0.64	1.42	RA
4AUEHM		58.25	0.35	0.68	69.68	0.39	0.87	GN
4B9ACM		58.00	0.10	0.19	69.03	-0.26	-0.57	GK
4DWQLU		57.10	-0.80	-1.55	68.90	-0.38	-0.84	MH
4FZE6Q		58.00	0.10	0.19	69.35	0.07	0.15	GK
4M3Q2N	*	56.93	-0.97	-1.89	68.10	-1.18	-2.61	GK
4VAZFM		57.58	-0.32	-0.63	69.25	-0.03	-0.07	GK
62EVYM		58.13	0.23	0.44	69.05	-0.23	-0.51	GK
62P8ZK	X	62.25	4.35	8.42	62.23	-7.06	-15.56	GL
6NPT3U		57.63	-0.27	-0.53	69.30	0.02	0.04	GL
6W8XFN		58.08	0.18	0.34	69.33	0.04	0.09	GL
6XDR8Z	*	56.95	-0.95	-1.84	69.30	0.02	0.04	GK
6XPV4K		57.35	-0.55	-1.06	68.70	-0.58	-1.28	MW
74VCEQ		58.32	0.42	0.81	69.40	0.12	0.25	GL
7CUUVN		58.23	0.33	0.63	69.50	0.22	0.48	GL
7Z3F6M		57.53	-0.37	-0.73	68.65	-0.63	-1.39	GB
9G2F7L		58.63	0.73	1.40	69.90	0.62	1.36	GL
9HAPVX		58.48	0.58	1.11	69.53	0.24	0.54	GN
9HGBUH		57.60	-0.30	-0.58	68.93	-0.36	-0.79	MW
9UMRGV	X	56.95	-0.95	-1.84	66.53	-2.76	-6.08	GL
BA8G6M		57.63	-0.27	-0.53	69.35	0.07	0.15	GN
BEV7BD		57.50	-0.40	-0.77	69.05	-0.23	-0.51	GX
BNB9ZK		58.23	0.33	0.63	69.28	-0.01	-0.02	GL
BV8HGQ		58.48	0.58	1.11	69.65	0.37	0.81	GN
C4JUAH		58.30	0.40	0.78	69.50	0.22	0.48	GL
C4T8ZH		56.90	-1.00	-1.94	68.73	-0.56	-1.23	GN
D6ZPYE		58.60	0.70	1.36	69.70	0.42	0.92	PC

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WebCode	Data Flag	Sample G161 Lab Mean	Sample G161 Difference from Grand Mean	Sample G161 Comparative Performance Value	Sample G162 Lab Mean	Sample G162 Difference from Grand Mean	Sample G162 Comparative Performance Value	Instr Code
DHQJAM		58.75	0.85	1.65	70.10	0.82	1.80	GK
DNVHKC		57.95	0.05	0.10	69.50	0.22	0.48	GL
DQRECD		58.25	0.35	0.68	69.78	0.49	1.09	XX
EGJCXM		58.13	0.23	0.44	69.63	0.34	0.76	XX
EKVHC8		58.00	0.10	0.19	69.38	0.09	0.20	GX
EZPKZJ		57.40	-0.50	-0.97	69.10	-0.18	-0.40	GL
GN7EUE	*	57.08	-0.82	-1.60	68.05	-1.23	-2.72	MW
GVYVRH		58.05	0.15	0.29	68.98	-0.31	-0.68	GN
JBDZWA		57.50	-0.40	-0.77	68.48	-0.81	-1.78	GB
JU8BQJ		57.08	-0.82	-1.60	68.93	-0.36	-0.79	GL
JZUME7		58.80	0.90	1.74	69.98	0.69	1.53	GL
KER2CE		58.43	0.53	1.02	69.90	0.62	1.36	GL
LBPFZ2		57.65	-0.25	-0.48	68.45	-0.83	-1.83	XX
LQQYAD		58.33	0.43	0.82	69.78	0.49	1.09	GK
MARZEC		58.40	0.50	0.97	69.60	0.32	0.70	GL
MB3YB7		57.60	-0.30	-0.58	69.28	-0.01	-0.02	GA
NG9VU7		58.00	0.10	0.19	69.30	0.02	0.04	GL
NUAQQD		57.95	0.05	0.10	69.23	-0.06	-0.13	GL
NWKY87		58.23	0.33	0.63	69.33	0.04	0.09	GL
NZWELH		57.53	-0.37	-0.73	69.25	-0.03	-0.07	GL
PMZYK8		57.20	-0.70	-1.35	68.65	-0.63	-1.39	GL
QQ4DB4		58.03	0.13	0.24	69.18	-0.11	-0.24	GK
RLNW47		57.20	-0.70	-1.35	69.33	0.04	0.09	MW
TKEEXZ	X	55.85	-2.05	-3.97	68.80	-0.48	-1.06	GB
TXFHA2		57.70	-0.20	-0.39	68.93	-0.36	-0.79	GK
UDX862	*	56.68	-1.22	-2.37	68.18	-1.11	-2.44	GK
UPZUV7		57.78	-0.12	-0.24	69.75	0.47	1.03	RA
UYLX37		57.98	0.08	0.15	69.40	0.12	0.26	GK
VHW6XY		57.70	-0.20	-0.39	68.98	-0.31	-0.68	GB
VUNVEW		58.80	0.90	1.74	70.03	0.74	1.64	GL

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Interlaboratory Testing Program for Color & Appearance

Analysis 440

60 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample G161 Lab Mean	Sample G161 Difference from Grand Mean	Sample G161 Comparative Performance Value	Sample G162 Lab Mean	Sample G162 Difference from Grand Mean	Sample G162 Comparative Performance Value	Instr Code
VUVYF2		58.23	0.33	0.63	69.28	-0.01	-0.02	XX
VYZY4Y		57.98	0.08	0.15	69.40	0.12	0.26	GL
VZ8XVZ	X	56.45	-1.45	-2.81	67.70	-1.58	-3.49	XX
W4T3TW	*	58.33	0.43	0.82	68.73	-0.56	-1.23	GL
W989GD		57.85	-0.05	-0.10	69.28	-0.01	-0.02	GL
WAM48V	X	53.38	-4.52	-8.76	64.55	-4.73	-10.43	HA
WC8JCD		57.63	-0.27	-0.53	69.08	-0.21	-0.46	GL
WGFYL2	X	56.70	-1.20	-2.32	67.15	-2.13	-4.70	GB
WJMQ4V		57.83	-0.07	-0.14	69.35	0.07	0.15	RA
WNY6H9		58.63	0.73	1.40	69.60	0.32	0.70	GL
X9JW43		58.03	0.13	0.24	69.65	0.37	0.81	GL
XGNF4R	X	60.53	2.63	5.08	73.08	3.79	8.36	GL
YABBAR		58.68	0.78	1.50	69.83	0.54	1.20	GK
YE668T		58.10	0.20	0.39	69.70	0.42	0.92	GK
ZAPNZV		58.55	0.65	1.26	69.10	-0.18	-0.40	GQ
ZLFHA4	*	56.88	-1.02	-1.98	69.15	-0.13	-0.29	GL

Summary Statistics

	Sample G161	Sample G162
Grand Means	57.90 Gloss Units	69.28 Gloss Units
Stnd Dev Btwn Labs	0.52 Gloss Units	0.45 Gloss Units

Statistics based on 69 of 76 reporting participants

Comments on Assigned Data Flags for Test #440

62P8ZK(X) - High G161 values and low G162 values. Lab may have transposed data within sample sets.

9UMRGV(X) - Inconsistent in testing, low data for Sample G162. Also inconsistent within sample G162

TKEEXZ(X) - Inconsistent in testing, low data for Sample G161.

VZ8XVZ(X) - All values are low. Possible Systematic Error.

WAM48V(X) - All values are low.

WGFYL2(X) - Inconsistent in testing, low data for Sample G162.

XGNF4R(X) - All values are high.

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Key to Instrument Codes Reported by Participants			
GA	BYK Gardner Color - Guide Gloss	GB	BYK Gardner Spectro - Guide Sphere Gloss
GK	BYK-Gardner micro-gloss (60)	GL	BYK-Gardner micro-TRI-gloss
GN	BYK-Gardner new micro-TRI-gloss	GQ	BYK-Gardner haze-gloss
GX	BYK-Gardner (model not specified)	HA	Horiba 60 Degree Glossmeter
MH	X-Rite/Macbeth Color-Eye XTH	MW	Minolta Multi-Gloss 268
PC	Picogloss 503 Erichson	RA	Rhopoint Novo-Gloss Glossmeter
XX	Instrument make/model not specified by lab		

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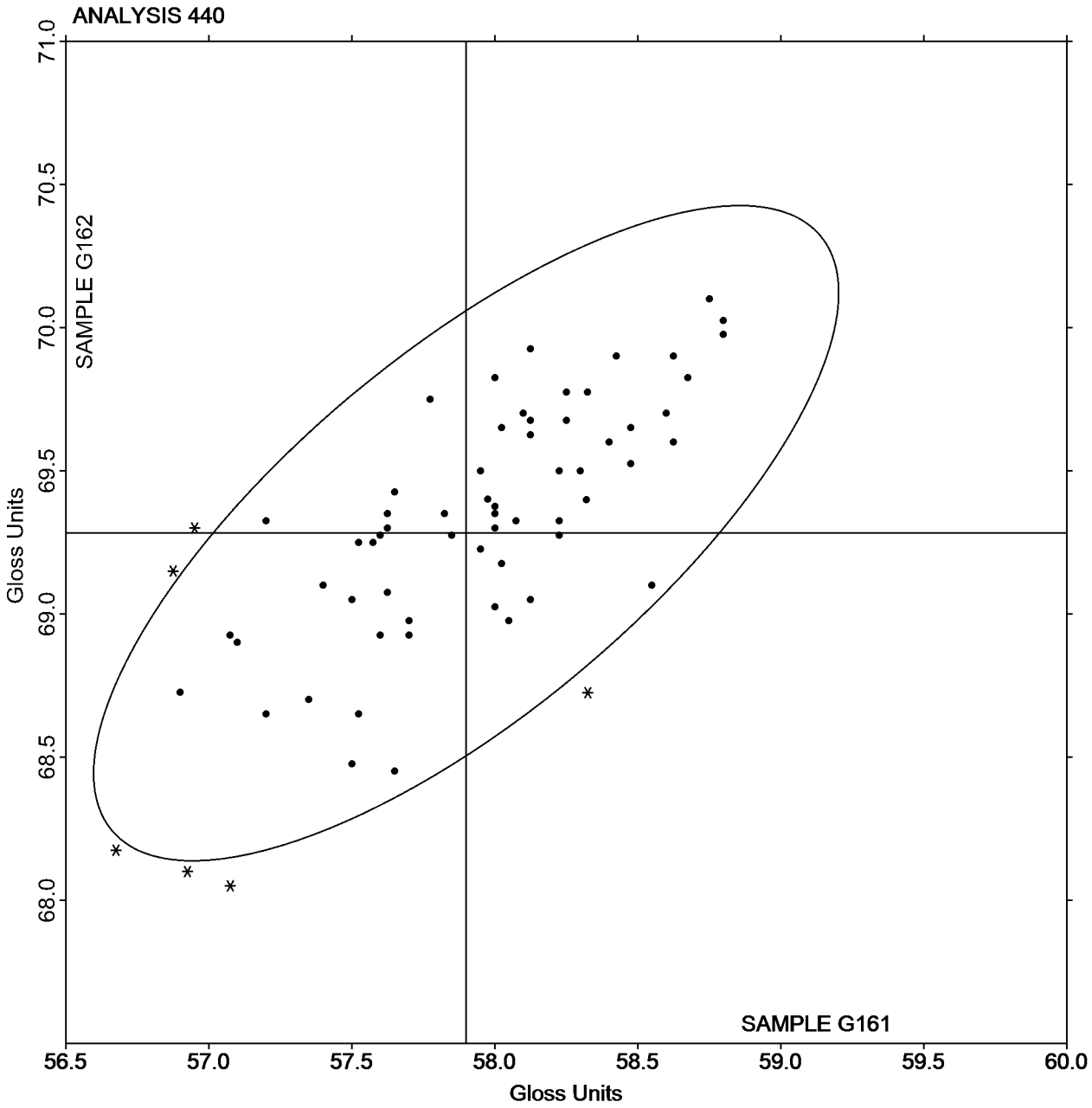
SAMPLE G161 = 57.90 Gloss Units SAMPLE G162 = 69.28 Gloss Units



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Interlaboratory Testing Program for Color & Appearance

Report #177
3rd Qtr 2016

Analysis 442

85 Degree Gloss - Paint Chips

ASTM Method D 523

WebCode	Data Flag	Sample L161 Lab Mean	Sample L161 Difference from Grand Mean	Sample L161 Comparative Performance Value	Sample L162 Lab Mean	Sample L162 Difference from Grand Mean	Sample L162 Comparative Performance Value	Instr Code
9UMRGV		6.25	-0.48	-1.92	9.80	-1.19	-1.90	GL
BA8G6M		6.60	-0.13	-0.51	10.83	-0.17	-0.26	GN
BNB9ZK		6.75	0.03	0.10	11.10	0.11	0.17	GL
BV8HGQ		6.93	0.20	0.81	11.28	0.28	0.45	GN
DNVHKC		6.70	-0.03	-0.10	10.83	-0.17	-0.26	GL
EZPKZJ		7.05	0.33	1.31	12.08	1.08	1.73	RA
WNY6H9		6.90	0.18	0.71	10.98	-0.02	-0.02	GN
ZLFHA4		6.63	-0.10	-0.40	11.05	0.06	0.09	GL

Summary Statistics

	Sample L161		Sample L162	
Grand Means	6.73	Gloss Units	10.99	Gloss Units
Stnd Dev Btwn Labs	0.25	Gloss Units	0.63	Gloss Units

Statistics based on 8 of 8 reporting participants

Key to Instrument Codes Reported by Participants

GL	BYK-Gardner micro-TRI-gloss	GN	BYK-Gardner new micro-TRI-gloss
RA	Rhopoint		

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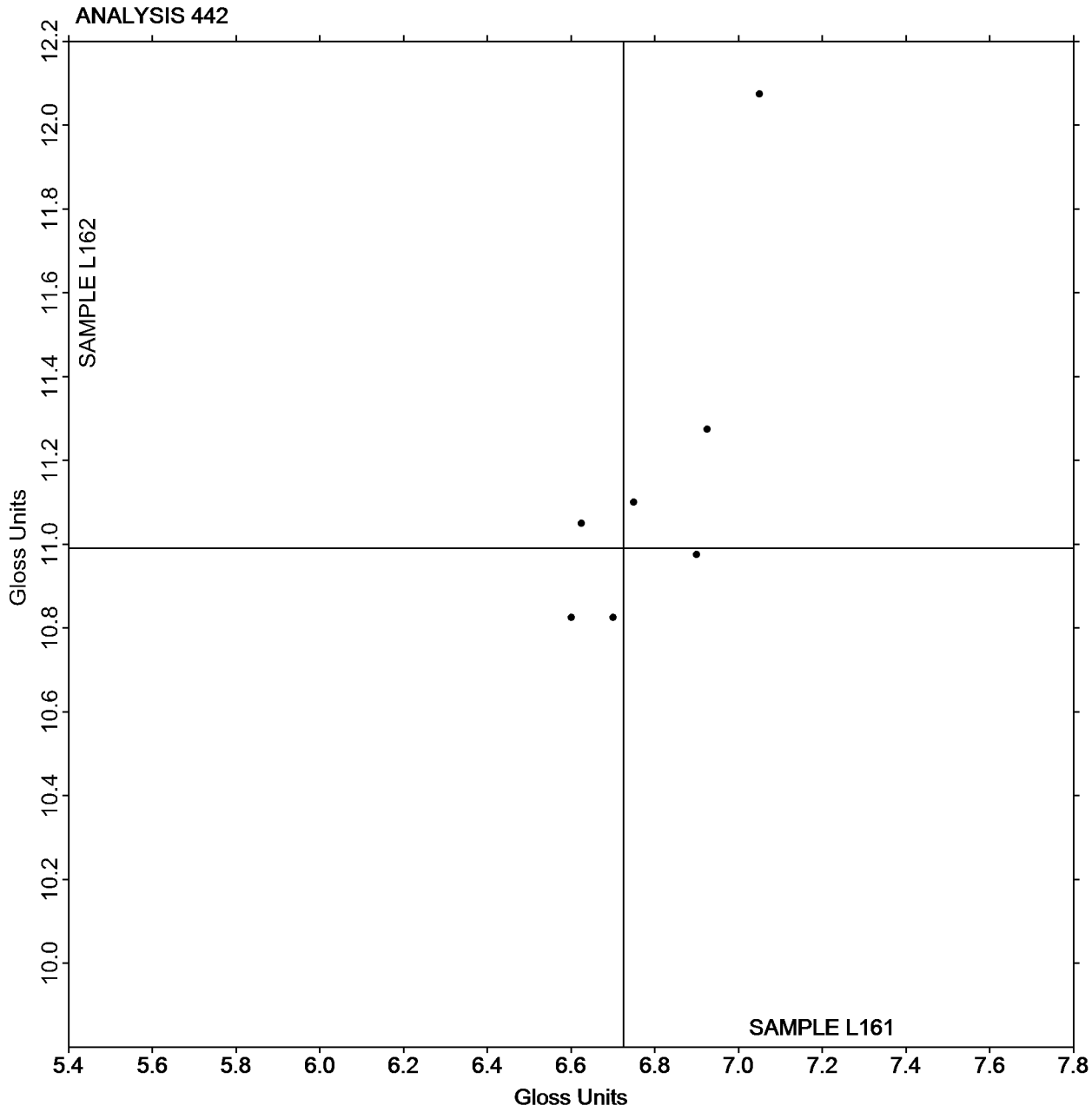
SAMPLE L161 = 6.73 Gloss Units SAMPLE L162 = 10.99 Gloss Units



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